Telephone Input Price Growth Regression - Christensen Data

1949-1992 w\ Divestiture Dummys 1984-1989, 1990-1992

LEC Input Price Change	Year	U.S. Input Price Change	Divestiture Binary Dummy 84-89	Divestiture Binary Dummy 90-92	Yield on Moody's Pub. Util. Bonds	Trend Line	Trend Line Variance (e)	e(t) less e(t-1)
3.2%	1949	-1.0%	0	0	2.66%	1.0%	2.2%	
5.1%	1950	6.3%	0	0	2.62%	3.3%	1.8%	-0.41%
8.8%	1951	7.9%	0	0	2.86%	4.0%	4.8%	3.01%
8.6%	1952	1.2%	0	0	2.96%	1.9%	6.7%	1.88%
2.4%	1953	3.7%	0	0	3.20%	2.9%	-0.5%	-7.17%
1.9%	1954	0.6%	0	0	2.90%	1.7%	0.2%	0.71%
5.4%	1955	6.6%	0	0	3.06%	3.7%	1.7%	1.46%
1.7%	1956	0.7%	0	0	3.36%	2.0%	-0.3%	-2.02%
-1.1%	1957	3.7%	0	0	3.89%	3.4%	-4.5%	-4.14%
3.3%	1958	0.5%	0	0	3.79%	2.3%	1.0%	5.50%
5.4%	1959	7.0%	0	0	4.38%	4.8%	0.6%	-0.41%
4.2%	1960	-0.6%	0	0	4.41%	2.4%	1.8%	1.22%
3.9%	1961	3.6%	0	0	4.35%	3.7%	0.2%	-1.60%
2.2%	1962	4.4%	0	0	4.33%	3.9%	-1.7%	-1.94%
1.0%	1963	3.8%	0	0	4.26%	3.7%	-2.7%	-0.96%
6.0%	1964	4.5%	0	0	4.40%	4.0%	2.0%	4.67%
0.5%	1965	5.7%	0	0	4.49%	4.4%	-3.9%	-5.95%
1.1%	1966	4.6%	0	0	5.13%	4.6%	-3.5%	0.49%
1.9%	1967	2.0%	0	0	5.51%	4.0%	-2.1%	1.36%
4.2%	1968	4.4%	0	0	6.18%	5.2%	-1.0%	1.05%
2.1%	1969	3.7%	0	0	7.03%	5.6%	-3.5%	-2.49%
3.8%	1970	3.3%	0	0	8.04%	6.2%	-2.4%	1.10%
4.2%	1971	6.8%	0	0	7.39%	6.9%	-2.7%	-0.26%
8.0%	1972	7.2%	0	0	7.21%	6.9%	1.1%	3.80%
0.6%	1973	6.3%	0	0	7.44%	6.8%	-6.2%	-7.28%
5.9%	1974	4.2%	0	0	8.57%	6.9%	-1.0%	5.16%
14.2%	1975	9.4%	0	0	8.83%	8.7%	5.5%	6.44%
10.7%	1976	9.1%	0	0	8.43%	8.4%	2.3%	-3.12%
6.1%	1977	8.6%	0	0	8.02%	7.9%	-1.8%	-4.15%
7.6%	1978	7.8%	0	0	8.73%	8.2%	-0.6%	1.25%
7.2%	1979	8.2%	0	0	9.63%	8.9%	-1.7%	-1.17%
14.6%	1980	6.6%	0	0	11.94%	10.1%	4.5%	6.26%
11.6%	1981	9.9%	0	0	14.17%	12.7%	-1.1%	-5.66%
12.1%	1982	3.7%	0	0	13.79%	10.5%	1.6%	2.76%
12.8%	1983	5.6%	0	0	12.04%	9.8%	3.0%	1.35%
1.8%	1984	7.4%	1	0	12.71%	2.4%	-0.6%	-3.55%
0.1%	1985	4.0%	1	0	11.37%	0.3%	-0.2%	0.35%
1.3%	1986	3.8%	1	0	9.02%	-1.4%	2.7%	2.95%
1.7%	1987	3.1%	1	0	9.38%	-1.4%	3.1%	0.37%
-3.2%	1988	4.4%	1	0	9.71%	-0.7%	-2.5%	-5.55%
-3.7%	1989	4.1%	1	0	9.26%	-1.2%	-2.5%	-0.08%
11.9%	1990	4.2%	0	1	9.32%	6.3%	5.6%	8.12%
1.3%	1991	2.9%	0	1	8.77%	5.5%	-4.2%	-9.79%
4.4%	1992	5.1%	0	1	8.14%	5.8%	-1.4%	2.85%

Constant	-0.0061
Standard Error of Y	0.0309
R Squared	0.5600
Observations	44
Degrees of Freedom	39

	X Coeff.	Standard Error of Coeff.	T Stat	T Critical Value @ 90%	
U.S. Input Price	0.3209	0.2085	1.5392	1.3044	
Divestiture, 84-89	-0.0851	0.0158	-5.3981	1.3044	
Divestiture, 90-92	-0.0111	0.0194	-0.5691	1.3044	Not Significant
Moody's Bond Yield	0.7174	0.1877	3.8225	1.3044	

F Statistic	12.4114
F Critical Value @ 99%	3.3260
Durbin-Watson Critical Value @ 99%	1.5800
Durbin-Watson Statistic	1.7811
Durbin-Watson Critical Value @ 99%	2.4200

Telephone Input Price Growth Regression - NERA Data

1960-1992 w\ Divestiture Dummy 1984-1992

LEC Input Price Change	Year	U.S. Input Price Change	Divestiture Binary Dummy	Yield on Moody's Pub. Util. Bonds	Trend Line	Trend Line Variance (e)	e(t) less e(t-1)
2.4%	1960	1.7%	0	4.41%	2.6%	-0.2%	
4.0%	1961	2.9%	0	4.35%	3.0%	1.0%	1.26%
3.1%	1962	4.5%	0	4.33%	3.5%	-0.4%	-1.39%
4.9%	1963	3.9%	0	4.26%	3.2%	1.7%	2.03%
2.4%	1964	5.4%	0	4.40%	3.8%	-1.4%	-3.05%
2.4%	1965	4.4%	0	4.49%	3.5%	-1.1%	0.26%
1.5%	1966	5.5%	0	5.13%	4.2%	-2.7%	-1.62%
5.0%	1967	2.8%	0	5.51%	3.6%	1.4%	4.13%
6.1%	1968	6.4%	0	6.18%	5.1%	1.0%	-0.42%
2.7%	1969	4.0%	0	7.03%	4.9%	-2.2%	-3.14%
4.0%	1970	3.2%	0	8.04%	5.2%	-1.2%	0.97%
6.5%	1971	6.6%	0	7.39%	5.9%	0.6%	1.81%
7.6%	1972	6.0%	0	7.21%	5.6%	2.0%	1.39%
6.6%	1973	8.6%	0	7.44%	6.6%	0.0%	-1.95%
4.8%	1974	4.2%	0	8.57%	5.8%	-1.0%	-1.07%
9.3%	1975	8.5%	0	8.83%	7.3%	2.0%	3.00%
9.2%	1976	9.2%	0	8.43%	7.3%	1.9%	-0.09%
4.8%	1977	7.3%	0	8.02%	6.5%	-1.7%	-3.57%
7.3%	1978	7.0%	0	8.73%	6.8%	0.5%	2.18%
2.9%	1979	7.7%	0	9.63%	7.5%	-4.6%	-5.14%
6.9%	1980	7.0%	0	11.94%	8.7%	-1.8%	2.88%
11.0%	1981	9.5%	0	14.17%	10.7%	0.3%	2.02%
9.3%	1982	3.1%	0	13.79%	8.5%	0.8%	0.53%
13.7%	1983	6.2%	0	12.04%	8.5%	5.2%	4.44%
1.8%	1984	6.5%	1	12.71%	4.1%	-2.3%	-7.58%
0.1%	1985	4.0%	1	11.37%	2.6%	-2.5%	-0.14%
1.3%	1986	3.8%	1	9.02%	1.2%	0.1%	2.62%
1.7%	1987	3.2%	1	9.38%	1.2%	0.5%	0.38%
-3.2%	1988	4.6%	1	9.71%	1.8%	-5.0%	-5.53%
-3.7%	1989	4.2%	1	9.26%	1.4%	-5.1%	-0.11%
11.9%	1990	4.3%	1	9.32%	1.5%	10.4%	15.53%
1.3%	1991	2.9%	1	8.77%	0.7%	0.6%	-9.84%
4.4%	1992	5.1%	1	8.14%	1.1%	3.3%	2.77%

Constant	-0.0046
Standard Error of Y	0.0308
R Squared	0.4440
Observations	33
Degrees of Freedom	29

	X Coeff.	Standard Error of Coeff.	T Stat	T Critical Value @ 90%	
U.S. Input Price	0.3140	0.3179	0.9878	1.3110	Not Significant
Divestiture, 84-92	-0.0480	0.0144	-3.3365	1.3110	
Moody's Bond Yield	0.5794	0.2350	2.4653	1.3110	

F Statistic	7.7208
F Critical Value @ 99%	4.5400
Durbin-Watson Critical Value @ 99%	1.4200
Durbin-Watson Statistic	2.1196
Durbin-Watson Critical Value @ 99%	2.5800

Telephone Input Price Growth Regression - NERA Data

1960-1992 w\ Divestiture Dummy 1984-1989

LEC Input Price Change	Year	U.S. Input Price Change	Divestiture Binary Dummy	Yield on Moody's Pub. Util. Bonds	Trend Line	Trend Line Variance (e)	e(t) less e(t-1)
2.4%	1960	1.7%	0	4.41%	2.4%	0.0%	
4.0%	1961	2.9%	0	4.35%	2.7%	1.3%	1.30%
3.1%	1962	4.5%	0	4.33%	3.1%	-0.0%	-1.35%
4.9%	1963	3.9%	0	4.26%	2.9%	2.0%	2.02%
2.4%	1964	5.4%	0	4.40%	3.4%	-1.0%	-3.03%
2.4%	1965	4.4%	0	4.49%	3.2%	-0.8%	0.23%
1.5%	1966	5.5%	0	5.13%	4.0%	-2.5%	-1.65%
5.0%	1967	2.8%	0	5.51%	3.4%	1.6%	4.02%
6.1%	1968	6.4%	0	6.18%	4.9%	1.2%	-0.39%
2.7%	1969	4.0%	0	7.03%	4.8%	-2.1%	-3.29%
4.0%	1970	3.2%	0	8.04%	5.3%	-1.3%	0.84%
6.5%	1971	6.6%	0	7.39%	5.8%	0.7%	1.97%
7.6%	1972	6.0%	0	7.21%	5.5%	2.1%	1.40%
6.6%	1973	8.6%	0	7.44%	6.4%	0.2%	-1.90%
4.8%	1974	4.2%	0	8.57%	5.9%	-1.1%	-1.31%
9.3%	1975	8.5%	0	8.83%	7.4%	1.9%	3.09%
9.2%	1976	9.2%	0	8.43%	7.3%	1.9%	-0.03%
4.8%	1977	7.3%	0	8.02%	6.5%	-1.7%	-3.57%
7.3%	1978	7.0%	0	8.73%	6.9%	0.4%	2.10%
2.9%	1979	7.7%	0	9.63%	7.7%	-4.8%	-5.22%
6.9%	1980	7.0%	0	11.94%	9.1%	-2.2%	2.62%
11.0%	1981	9.5%	0	14.17%	11.3%	-0.3%	1.85%
9.3%	1982	3.1%	0	13.79%	9.2%	0.1%	0.40%
13.7%	1983	6.2%	0	12.04%	8.9%	4.8%	4.71%
1.8%	1984	6.5%	1	12.71%	2.0%	-0.2%	-4.97%
0.1%	1985	4.0%	1	11.37%	0.3%	-0.2%	-0.06%
1.3%	1986	3.8%	1	9.02%	-1.3%	2.6%	2.87%
1.7%	1987	3.2%	1	9.38%	-1.3%	3.0%	0.33%
-3.2%	1988	4.6%	1	9.71%	-0.6%	-2.6%	-5.53%
-3.7%	1989	4.2%	1	9.26%	-1.1%	-2.6%	-0.08%
11.9%	1990	4.3%	0	9.32%	6.5%	5.4%	8.06%
1.3%	1991	2.9%	0	8.77%	5.7%	-4.4%	-9.82%
4.4%	1992	5.1%	0	8.14%	5.9%	-1.5%	2.90%

Constant	-0.0114
Standard Error of Y	0.0243
R Squared	0.6551
Observations	33
Degrees of Freedom	29

	X Coeff.	Standard Error of Coeff.	T Stat	T Critical Value @ 90%	
U.S. Input Price	0.2874	0.2385	1.2049	1.3110	Not Significant
Divestiture, 84-89	-0.0747	0.0125	-5.9739	1.3110	
Moody's Bond Yield	0.6857	0.1815	3.7785	1.3110	

F Statistic	18.3594
F Critical Value @ 99%	4.5400
Durbin-Watson Critical Value @ 99%	1.4200
Durbin-Watson Statistic	2.2139
Durbin-Watson Critical Value @ 99%	2.5800

Telephone Input Price Growth Regression - NERA Data

1960-1992 w\ Divestiture Dummys 1984-1989, 1990-1992

LEC Input Price Change	Year	U.S. Input Price Change	Divestiture Binary Dummy 84-89	Divestiture Binary Dummy 90-92	Yield on Moody's Pub. Util. Bonds	Trend Line	Trend Line Variance (e)	e(t) less e(t-1)
2.4%	1960	1.7%	0	0	4.41%	2.4%	-0.0%	
4.0%	1961	2.9%	0	0	4.35%	2.7%	1.3%	1.31%
3.1%	1962	4.5%	0	0	4.33%	3.1%	-0.0%	-1.33%
4.9%	1963	3.9%	0	0	4.26%	2.9%	2.0%	2.01%
2.4%	1964	5.4%	0	0	4.40%	3.4%	-1.0%	-3.01%
2.4%	1965	4.4%	0	0	4.49%	3.2%	-0.8%	0.22%
1.5%	1966	5.5%	0	0	5.13%	4.0%	-2.5%	-1.65%
5.0%	1967	2.8%	0	0	5.51%	3.5%	1.5%	3.99%
6.1%	1968	6.4%	0	0	6.18%	4.9%	1.2%	-0.36%
2.7%	1969	4.0%	0	0	7.03%	4.9%	-2.2%	-3.32%
4.0%	1970	3.2%	0	0	8.04%	5.3%	-1.3%	0.82%
6.5%	1971	6.6%	0	0	7.39%	5.8%	0.7%	2.01%
7.6%	1972	6.0%	0	0	7.21%	5.5%	2.1%	1.39%
6.6%	1973	8.6%	0	0	7.44%	6.4%	0.2%	-1.88%
4.8%	1974	4.2%	0	0	8.57%	6.0%	-1.2%	-1.36%
9.3%	1975	8.5%	0	0	8.83%	7.4%	1.9%	3.13%
9.2%	1976	9.2%	0	0	8.43%	7.3%	1.9%	-0.02%
4.8%	1977	7.3%	0	0	8.02%	6.5%	-1.7%	-3.59%
7.3%	1978	7.0%	0	0	8.73%	6.9%	0.4%	2.09%
2.9%	1979	7.7%	0	0	9.63%	7.7%	-4.8%	-5.22%
6.9%	1980	7.0%	0	0	11.94%	9.1%	-2.2%	2.60%
11.0%	1981	9.5%	0	0	14.17%	11.3%	-0.3%	1.86%
9.3%	1982	3.1%	0	0	13.79%	9.3%	0.0%	0.34%
13.7%	1983	6.2%	0	0	12.04%	8.9%	4.8%	4.75%
1.8%	1984	6.5%	1	0	12.71%	2.0%	-0.2%	-4.93%
0.1%	1985	4.0%	1	0	11.37%	0.3%	-0.2%	-0.08%
1.3%	1986	3.8%	1	0	9.02%	-1.3%	2.6%	2.88%
1.7%	1987	3.2%	1	0	9.38%	-1.3%	3.0%	0.32%
-3.2%	1988	4.6%	1	0	9.71%	-0.6%	-2.6%	-5.52%
-3.7%	1989	4.2%	1	0	9.26%	-1.1%	-2.6%	-0.08%
11.9%	1990	4.3%	0	1	9.32%	6.3%	5.6%	8.22%
1.3%	1991	2.9%	0	1	8.77%	5.6%	-4.3%	-9.83%
4.4%	1992	5.1%	0	1	8.14%	5.7%	-1.3%	2.93%

Constant	-0.0111
Standard Error of Y	0.0247
R Squared	0.6553
Observations	33
Degrees of Freedom	28

	X Coeff.	Standard Error of Coeff.	T Stat	T Critical Value @ 90%	
U.S. Input Price	0.2774	0.2549	1.0881	1.3140	Not Significant
Divestiture, 84-89	-0.0752	0.0133	-5.6677	1.3140	
Divestiture, 90-92	-0.0021	0.0160	-0.1284	1.3140	Not Significant
Moody's Bond Yield	0.6916	0.1903	3.6345	1.3140	

F Statistic	13.3067
F Critical Value @ 99%	3.7800
Durbin-Watson Critical Value @ 99%	1.6300
Durbin-Watson Statistic	2.2324
Durbin-Watson Critical Value @ 99%	2.3700

Attachment B

Appendix F demonstrates that in competitive equilibrium -

(1) $(OUTPUT\ PRICE) * (OUTPUT\ QUANTITY) = (INPUT\ PRICE) * (INPUT\ QUANTITY)$

Abbreviated -

(2) $(P * OUT) = (W * INP)$

or -

(3) $\left(\frac{OUT}{INP}\right) = \left(\frac{W}{P}\right)$

Therefore, the respective growth rates are equal and can be defined by -

(4) $LN\left(\frac{OUT_t}{OUT_{t-1}} \ / \ \frac{INP_t}{INP_{t-1}}\right) = LN\left(\frac{W_t}{W_{t-1}} \ / \ \frac{P_t}{P_{t-1}}\right)$

The left term can be restated as -

(5) $LN\left(\frac{OUT_t}{OUT_{t-1}} \ / \ \frac{INP_t}{INP_{t-1}}\right) \Rightarrow LN\left(\frac{OUT_t}{OUT_{t-1}}\right) - LN\left(\frac{INP_t}{INP_{t-1}}\right) \Rightarrow \%\Delta TFP$

The right term can be restated as -

(6) $LN\left(\frac{W_t}{W_{t-1}} \ / \ \frac{P_t}{P_{t-1}}\right) \Rightarrow LN\left(\frac{W_t}{W_{t-1}}\right) - LN\left(\frac{P_t}{P_{t-1}}\right) \Rightarrow \%\Delta W - \%\Delta P$

As a result -

(7) $\%\Delta TFP = \%\Delta W - \%\Delta P$

or -

(8) $\%\Delta P = \%\Delta W - \%\Delta TFP$

The measure of unit cost change can be further simplified by substituting -

(9) $\%\Delta P = LN\left(\frac{W_t}{W_{t-1}}\right) - LN\left(\frac{OUT_t}{OUT_{t-1}}\right) + LN\left(\frac{INP_t}{INP_{t-1}}\right)$

or -

(10) $\%\Delta P = LN\left(\frac{W_t * INP_t}{W_{t-1} * INP_{t-1}}\right) - LN\left(\frac{OUT_t}{OUT_{t-1}}\right)$

Since -

(11) $INPUT\ COST = (W * INP)$

Therefore -

(12) $\%\Delta P = LN\left(\frac{INPUT\ COST_t}{INPUT\ COST_{t-1}}\right) - LN\left(\frac{OUT_t}{OUT_{t-1}}\right)$

or -

(13) $\%\Delta P = (\%\Delta INPUT\ COST) - (\%\Delta OUT)$

The rate of return equation can be expressed as -

$$(14)\quad P_t = \frac{INPUT\ COST_t}{DEMAND\ QUANTITY_t}$$

Therfore -

$$(15)\quad P_t \ / \ P_{t-1} = \frac{INPUT\ COST_t}{DEMANDQUANTITY_t} \ / \ \frac{INPUT\ COST_{t-1}}{DEMANDQUANTITY_{t-1}}$$

Restated -

$$(16)\quad \%\Delta P = LN\left(\frac{INPUT\ COST_t}{INPUT\ COST_{t-1}}\right) \ / \ LN\left(\frac{DEMAND\ QUANTITY_t}{DEMAND\ QUANTITY_{t-1}}\right)$$

or -

$$(17)\quad \%\Delta P = LN\left(\frac{INPUT\ COST_t}{INPUT\ COST_{t-1}}\right) - LN\left(\frac{DEMAND\ QUANTITY_t}{DEMAND\ QUANTITY_{t-1}}\right)$$

or -

$$(18)\quad \%\Delta P = (\%\Delta INPUT\ COST) - (\%\Delta OUT)$$

which is equal to the formula for the direct method.

Attachment C

Economic Sharing Adjustment

Ln#	Description	Source	Sharing Ranges % (A)	Sharing Ranges $ (B)=Ln10ColC*Col	Amounts (C)
1	Total Operating Expenses	TFPRP	N/A	N/A	250,000,000
2	Booked Depreciation & Amortization	TFPRP	N/A	N/A	68,000,000
3	Wages and Salaries	TFPRP	N/A	N/A	11,000,000
4	Benefits	TFPRP	N/A	N/A	26,000,000
5	Materials Rents & Services	Ln1-Ln2-Ln3-Ln4	N/A	N/A	145,000,000
6	Capital Cost	TFPRP	N/A	N/A	160,000,000
7	Baseline Total Company Revenue	Ln3+Ln4+Ln5+Ln6	N/A	N/A	342,000,000
8	Booked Total Company Revenue	TFPRP	N/A	N/A	386,000,000
9	Booked Interstate Revenue	TFPRP	N/A	N/A	97,000,000
10	Baseline Interstate Revenue	Ln9/Ln8*Ln7	N/A	N/A	85,943,005
11	Sharing Range 1, 50% Between 102.50% and 112.50%	Min(0,(Min(Ln11ColB,Ln9ColC)-	102.50%	88,091,580	(4,297,150)
12	of Baseline Interstate Revenue	Min(Ln12ColB,Ln9ColC))*.5)	112.50%	96,685,881	
13	Sharing Range 2, 100% Above 113% of Baseline Interstate Revenue	Min(0,Ln13ColB-Ln9ColC)	112.50%	96,685,881	(314,119)
14	Allowed Interstate Revenue	Ln9+Ln11+Ln13	N/A	N/A	92,388,731
15	% of Allowed Interstate Revenue to Baseline	Ln14/Ln10	N/A	N/A	107.50%

Revenue Effect of a 1% Change in Rate of Return

Ln#	Description	Source	1994 Base Period (A)
1	Revenue	Records	32,361,957
2	Return	Records	7,755,244
3	Investment	Records	48,685,191
4	Rate of Return	Ln2/Ln3	15.93%
5	Target Rate of Return	Ln4-0.01	14.93%
6	Allowed Return	Ln5*Ln3	7,268,392
7	Tax Base Adjustments	Records	(60,306)
8	Fixed Charges	Records	1,301,688
9	ITC Amortization	Records	265,408
10	FIT Rate	Records	35.00%
11	SIT Rate	Records	7.81%
12	Federal Income Tax	[(Ln6-Ln7-Ln8-Ln9)*(Ln10/(1-Ln10)]-Ln9	2,836,993
13	State Income Tax	(Ln6-Ln7-Ln8+Ln12)*Ln11	692,279
14	Operating Expenses	Records	20,756,793
15	Allowed Revenue	Ln6+Ln12+Ln13+Ln14	31,554,457
16	% Revenue Change	Ln15/Ln1-1	-2.50%